

## **On-Farm Soybean IPM Education Programs: Cultivating Enhanced Soybean Management**

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Soybean producers in six counties in New York State

### **Abstract:**

In 2007, 38 participants representing 25 farms in 6 counties in New York State participated in on-farm soybean Integrated Pest Management (IPM) programs. Participants were actively engaged in a growing-season-long educational program discussing critical pest and crop management topics arising during the growing season. Multiple meetings held in farmer fields allowed for reinforcement of concepts learned. Participating producers benefited from the timely collection of data from their fields throughout the growing season. The pest information gathered from scouting these soybean fields during the growing season was used in other extension educational efforts across New York State.

### **Background and Justification:**

Sound crop and pest management is a key component of economical and efficient field crop production in New York State. The diverse landscape of New York State provides a variety of environmental conditions that present crop production and pest management challenges and provides opportunities for locally based and locally adapted Integrated Pest Management (IPM) and Integrated Crop Management (ICM) training. Many agricultural producers have indicated that they would like to learn more about Integrated Crop and Pest Management as a way to increase profits while protecting the environment. The Tactical Agriculture program (TAg) was initiated in the early 1990s to help field corn and alfalfa producers learn how to improve their crop and pest management. TAg is an intensive, on-farm, growing-season-long, educational program that brings together Cooperative Extension educators, field crop producers, and agribusiness personnel to teach, learn, and implement IPM and ICM practices. An experiential, hands-on educational philosophy is the foundation of the TAg program approach. TAg builds on the philosophy that a participant learning a new IPM or ICM tactic by hearing, demonstrating, discussing, and practicing new concepts will more likely retain the information and adopt the practice, especially when the information is reinforced throughout the growing season.

A soybean TAg team typically consists of 4 to 8 producers and agribusiness personnel from a local area. TAg groups are comprised of farming neighbors who meet at a participant's farm to learn, discuss, demonstrate and practice the IPM and ICM methods. Meetings are scheduled approximately once a month to capitalize on the educational and management opportunities of

the growing season. Participants are encouraged to be proactive and learn an IPM decision-making process. Many IPM options are presented, and participants are taught how to assess pest levels, and how to evaluate need, timing, and effectiveness of various management interventions. Thus, they can more effectively manage situations in real time during the growing season when the pest or crop issues are occurring. Producers are encouraged to consider and use non-pesticide options but to also include judicious use of chemical control tactics when appropriate. Each TAg participant brings his or her own experience and expertise, which enriches discussion and contribute to the groups' overall learning process. TAg participants enroll 1 field of soybeans which serve as classrooms for TAg meetings.

On-farm education has been shown to increase participation and rates of adoption of new concepts and technologies (Wuest et al. 1995; Flora 1991). On-farm locations of TAg meetings provide ideal opportunities for direct observation of potential disease, insect, and weed pest outbreaks. The on-farm setting fulfills a producer's desire to see how an IPM and ICM method or new technology might work on his or her own farm. The small group educational design promotes learning and effective communication among TAg participants and Extension facilitators. Participants learn from each other what agronomic methods might work on their farm given their unique crops, soils, equipment, management, and other individual farm strengths and constraints. Trust is gained among farmer, extension, and agribusiness participants. In addition to a set of basic topics addressed, the flexible nature of TAg programs allows facilitators to address unique situations or local concerns. Adapting TAg programs to meet local needs has great potential to dramatically increase the rate of adoption of IPM and ICM practices. For more information on this approach, please visit the following section of the NYS IPM website: <http://nysipm.cornell.edu/fieldcrops/tag/default.asp>

Needs of agricultural producers constantly change. For many producers, soybeans fit well with their field crop rotations, provide a useful homegrown source of livestock feed, and offer a valuable cash crop option. In New York State, soybean acreage has increased nearly 10-fold since 1986. The USDA National Agriculture Statistics Service estimated in November of 2007 that 203,000 acres of soybeans would be harvested in 2007 in NY, the largest acreage on record. The trend in soybean acreage expansion is expected to continue as local markets are enhanced by availability of commercial roasters and oil processing plants, favorable yield potential and commodity prices, and a continued increase in interest in production and marketing of soy biodiesel. As soybean acreage has increased, so have producer questions regarding crop protection.

Until recently, soybean pest concerns have been minimal in the northeast, generally restricted to weeds, and minor insect, disease and vertebrate pests affecting emergence, vegetative and reproductive phases of crop development. Given our Northeastern pest spectrum, many pest impacts have largely been minimized or avoided through an integrated approach based on selecting varieties for maturity group, disease resistance, and commercial commodity attributes and the timely implementation of sound agronomic practices including crop rotation. Regular field monitoring for pests and crop condition is encouraged to alert producers of potential problems.

With the detection of soybean rust in the southeastern US in November of 2004, many experts speculated that rust could have a substantial impact on soybean pest management in the future. In response, producers anticipated a need to be proactive in learning how to manage the problem should rust appear in New York. A season-long on-farm soybean education program is playing a major role in effectively communicating with farmers about Asian soybean rust identification and management, and the associated surge in interest and awareness of other foliar diseases. In addition, soybean aphid, a pest that was first documented in New York in 2001, has also dramatically increased the need for sound IPM education for soybean producers.

Weed management in soybeans will continue to be an important area for educating producers. While initially intended to be used occasionally to clean up weeds from problem fields, estimates from field crop extension educators indicate that at least 90 % of soybeans planted are Roundup Ready varieties. This management technique appears to work adequately in most cases, but it is essential for IPM educators to be proactive in keeping soybean farmers alert about the potential risk of developing herbicide resistance, shifts in the time of occurrence of weed species, and the role that other Roundup Ready crops (field corn and alfalfa) play in the use of this technology in the near future. Lambsquarter that appears to tolerate normal rates of round-up are becoming a larger concern to soybean farmers across NY. With two new exotic pests, numerous other occasionally severe pests, as well as increasing weed management challenges, it is crucial to use an educational delivery method that Cooperative Extension and other personnel can easily use in IPM outreach in soybean production systems. Soybean producers in Cayuga, Livingston/Ontario, Monroe, Oneida, and Seneca Counties were targeted in 2007 Soybean TAG efforts.

### **Objectives:**

- 1) Conduct on-farm season-long integrated pest management education programs for soybean producers across New York State. Discuss all agronomic and economic aspects of soybean production in New York State, with an emphasis on the identification, biology, and management of critical pests, including Asian soybean rust and soybean aphid.
- 2) Establish on-farm demonstration plots of pest and crop management tactics or new technologies on participant farms.
- 3) Evaluate the impact of the education programs by measuring the level of adoption of Integrated Pest Management (IPM) and Integrated Crop Management (ICM) practices by participating soybean producers.

### **Procedures:**

Soybean on-farm education programs were implemented in Cayuga, Livingston/Ontario, Monroe, Oneida, and Seneca Counties in 2007. Table 1 summarizes the number of farms, coordinating Cornell Cooperative Extension Educators, and acres targeted.

**Table 1. Description of TAG Teams in 2007.** Number of farms and soybean acreage impacted for each county program

County	Local CCE TAg Team Coordinator	Number of Farms	Number of Team Members	Approximate number of Soybean Acres Targeted
Cayuga	Brian Aldrich	6	8	1,180
Livingston/Ontario	Mike Stanyard	5	9	2,100
Monroe	Mike Stanyard	4	9	2,000
Oneida	Jeff Miller	4	4	260
Seneca	Mike Dennis	6	8	1,050
<b>Totals:</b>		<b>25</b>	<b>38</b>	<b>6,590</b>

#### EDUCATIONAL DESIGN:

Each County identified key IPM and ICM educational needs based on initial meetings with the farmers who chose to participate. Local educators organized and held timely meetings to address the identified topics. Meetings were scheduled relative to the pest-related needs and opportunities identified. Meetings were held to provide relevant teaching in critical educational moments during the growing season. Mike Stanyard and Nancy Glazier (Mike's assistant and scout) established one soybean TAg team on the border of Livingston and Ontario Counties and one team in Monroe County. The soybean producers involved included full time field crop producers, dairy farmers, and producers with vegetables in their rotations. Jeff Miller coordinated a soybean TAg team in Oneida County. Many of the producers in Oneida County were very new to soybean crop production. Mike Dennis conducted a soybean TAg team in Seneca County comprised of Mennonite dairy farmers and full time field crop farmers. Brian Aldrich coordinated a soybean TAg team in Cayuga County made up of field crop farmers. Table 2 presents the range of topics offered during 2007 for the locally-adapted soybean TAg meetings.

**Table 2. Soybean TAg Topics.** Overview of topics covered at Soybean TAg meetings in Cayuga, Livingston/Ontario, Monroe, Oneida, and Seneca Counties in 2007.

Meeting Time	Topics Taught
June	Soybean stages of growth, plant population assessment - stand counts, seed corn maggot, slugs, early season disease pests: seedling rots and blights, soybean aphids, weed identification and management
July	Soybean stages of growth, soybean aphid identification and management, progress of on-farm demonstrations, soybean rust and other foliar diseases (Septoria brown spot, downy mildew), white mold, results of NY on-farm soybean fungicide trials conducted in 2006
August	Soybean stages of growth, defoliating insects, soybean rust update, weed identification and management, white mold, farm-by-farm season-long pest management review, progress of on-farm demonstrations
September	Management of pests of stored soybeans, soybean harvest issues, planning for next year's crop: crop rotation, variety selection and seed treatment options; summary of on-farm demonstration observations so far

**FIELD SCOUTING:** Weekly monitoring of one field on each participating farm helped farmers document timely data on current crop condition and pest status. Scouting reports were shared with farmers weekly, and scouting data was used as a basis for discussion at each TAg team meeting. Experience shows that producers learn more and are more likely to adopt IPM and ICM

practices when pest data collected from their *own* fields are discussed. This information more fully engages participants in the learning and decision making process. Real data on pest and crop management observations from a producer's own farm is ultimately more convincing and effective at promoting behavioral changes than hypothetical examples. Obtaining field observations at regular intervals helped to reinforce the value of scouting their other fields during the current season and all of their fields in the future. Summer assistants scouted fields weekly in all 5 TAg team programs.

#### EVALUATION OF THE PROGRAM:

Participants were asked to complete a pre-test and a post-test to document a baseline of participant's IPM / ICM knowledge and skill level prior to program participation, to assess changes resulting from involvement with the TAg program, and to identify subject areas requiring special attention. A post-season survey was also conducted to determine how many IPM or ICM practices participants planned to continue doing, on how many acres, and participants' suggestions for improving IPM and ICM education efforts in their county.

#### **Results and Discussion:**

The Tactical Agriculture program has been a model for IPM and ICM information transfer in New York State for over 15 years. Five soybean TAg team programs were successfully implemented in 2007. Participants learned how to correctly identify, sample, assess, and apply different management tools on potential soybean pests including insects, weeds and diseases. They also gained the self confidence needed to make environmentally and economically sound pest management decisions on their own.

Initial meetings addressed hybrid selection, soil pH, seeding rate, and fertility. During the meetings in mid June, we conducted stand counts, provided an update on soybean rust development in the southeast, practiced soybean aphid scouting (including monitoring for natural enemies), and conducted a weed assessment. Soybean aphids appeared early in the season, and populations quickly grew to threshold levels in several locations. Dry weather through June and July prevented many of the natural enemies that typically control aphids to successfully establish. Also exacerbated by dry weather conditions, spider mites were prevalent in many of the TAg team fields. An emphasis continued to be placed on understanding plant growth stages at every meeting to help participants understand vulnerable stages in plant growth and development, and to correctly time management actions, if management was necessary. During July and August meetings, we discussed and observed foliar diseases of soybean, giving special attention to distinguishing each disease from soybean rust. Drier than average conditions minimized concerns about many foliar diseases, including white mold. September meetings focused on pests of soybeans in on-farm storage, as well as crop rotation, variety selection, and seed treatment decisions for 2008. A sample of a scouting report in the "samples of materials" at the end of this report describes seasonal pest occurrence on one representative farm.

Soybean producers responded very well to the soybean TAg program, even though the audience needs varied greatly among the five teams. Many of the producers involved in Oneida County are very new to growing soybeans, so the TAg program has been able to provide an extra benefit of background information for soybean crop production. Similarly, many farmers on the Seneca County team produce few acres of soybeans and are relatively new to soybean production. Prior

to participation in the TAg team, most of the information used in their crop and pest management decisions was based on information only from seed and chemical sales representatives. Four of the 5 teams had father-son groups. In all these cases, the educators remarked on the increased impact of educating 2 generations, especially the *next* generation of farmers in our state.

New York State again participated in the national Soybean Sentinel plot network in 2007 under the guidance of Gary Bergstrom, Cornell Department of Plant Pathology, and Mary McKellar, Northeast Plant Diagnostic Center. The sentinel plot network, designed to provide an early warning to the arrival of soybean rust, has had the added benefit of greatly improving our understanding of the occurrence of other important diseases including several diseases which were never before detected in NY. The network also documented the annual status of soybean aphid. Four of the 19 sentinel plots in NY were located on the farms of soybean TAg team participants (one in each of Cayuga, Monroe, Oneida, and Seneca counties). If soybean rust had been present in NY in 2007, our TAg teams would have played a key role in keeping soybean farmers across New York State informed. See the website <http://sbrusa.net/> for more information on the national soybean rust efforts, and visit <http://www.ppath.cornell.edu/soybeanrustny/default.html> for more information on the NY network.

The increased attention that soybean diseases are receiving has led to an increase in the use of foliar fungicides for an overall “Plant Health” effect, even when significant diseases are not documented to be an economic threat. We included in the soybean TAg curriculum in 2007 the results of on-farm studies from 2006 showing economic analysis of the use of soybean fungicides in the absence of significant diseases. The fact sheet distributed at meetings can be found online at [http://nysipm.cornell.edu/publications/soy\\_plant\\_health/files/SoyPlantHealth.pdf](http://nysipm.cornell.edu/publications/soy_plant_health/files/SoyPlantHealth.pdf). Partial budget analyses demonstrate that fungicides in these circumstances did not pay.

Recent pest and crop observations gathered from monitoring one field of each participant were shared at every meeting. The weekly scouting visits encouraged members to begin their own sampling programs and become more familiar with their crops. The pest information gathered from scouting the soybean TAg fields during the growing season also was used in other extension educational efforts across New York State, including the NYS IPM Weekly Field Crops Pest Report (<http://nysipm.cornell.edu/fieldcrops/tag/pestrpt/default.asp>). This report was distributed to field crop educators, crop consultants, and other agri-business personnel throughout NY. Information was also posted on county and regional program websites and included in Extension newsletters. The resulting “multiplier effect” greatly increased the reach of the on-farm education programs beyond the 38 participants on TAg teams.

Several farms conducted informal side-by-side trials of weed, insect, and disease management practices. Following are results from trials on 2 farms on the Cayuga County team.

- 1) Quadris side-by-side, replicated twice. Test strips were approximately 1.55 acres. Spray date was July 31. The mean yield of the two strips that were not sprayed was 33.82 bu/acre. The mean of the two strips treated with Quadris fungicide was 34.43 bu/acre. Yields were corrected to 13% moisture. Accuracy was estimated to be +/- two to three bushels. The

farmers and the local educator concluded this yield difference did not justify the expense of the material plus application cost.

- 2) Warrior insecticide side-by-side, soybean aphid control. SBA's were well over threshold, 1,400 per plant. Plants were at R3 growth stage. Results: With warrior: 33.97 bu/acre; Unsprayed: 30.32 bu/acre; Difference: 3.65. Yields were corrected to 13% moisture. The farmer observed the SBA population crashed overnight, in between when he called the spray company to when they arrived the next day. By the time the farmer made the observation, the spray truck had arrived, and he didn't want to turn them away at that point. The field had been over threshold for several weeks, but ladybugs were unable to check the SBA population in combination with the drought stress. With better moisture, the beans might have been able to outgrow the SBA damage. [This farmer has in the past observed high numbers of soybean aphids controlled by ladybugs and other natural enemies.]

Several participating farmers are thinking about plans for planting strips of insecticide-treated seed to compare soybean aphid numbers next year.

PERCEPTION OF THE EDUCATIONAL PROGRAMS BY PRODUCERS: TAg participants provided very positive feedback regarding their TAg training experience. One hundred percent of the TAg participants in 2007 agreed that the program helped them to better understand pest and crop management issues. Sixty-four percent of producer participants indicated that they would highly recommend the program to other producers in their area, and 36% would recommend it. Specific comments are listed in the "Samples of Materials" section at the end of this report.

KNOWLEDGE AND ADOPTION OF IPM AND ICM: Results of the pre and post-testing indicated that TAg participants all increased their knowledge of IPM and ICM. Scores on pre-tests averaged 57%. At the completion of the program, participants' scores greatly increased to an average of 76%. Mean scores on pre and post tests are presented by team in Table 3.

**Table 3. Pre and Post Test Scores.** Mean scores on pre and post tests by county program

County	Mean Pre-test Score (%)	Mean Post-test Score (%)	Percent Improvement
Cayuga	48	66	18
Livingston/Ontario	57	86	29
Monroe	71	87	16
Oneida	64	77	13
Seneca	44	64	20
<b>Overall</b>	<b>57</b>	<b>76</b>	<b>19</b>

#### IMPACTS:

The program provided valuable information and served as a forum of discussion for a wide range of soybean producers. Emphasis was placed on educating participating producers about two new invasive pests of soybeans. Soybean aphids have been present in NY for several years, and occasional severe infestations have caused yield losses. However, many producers do not make management decisions based on field observations and economic thresholds. Soybean aphid identification, scouting, and management were major topics covered during soybean TAg meetings. Although Asian soybean rust still has not yet been detected in NY, producers were concerned about the possible occurrence of this disease and the occurrence of diseases that have

similar symptoms. In our program evaluation, we emphasized these two pest problems with the following questions: Because of TAg, 1) Do you feel more knowledgeable about Asian soybean rust?; 2) Do you have an improved ability to scout for soybean diseases and to distinguish common diseases from rust?; 3) Are you more knowledgeable about whom to contact in case of the appearance of rust?; and 4) Are you more knowledgeable about soybean aphid life cycle, damage, and thresholds? All participants answered yes to all four questions. Many of the farmers commented to the local educators that they will now base decisions regarding insecticides for soybean aphid on scouting observations rather than on what their neighbors are doing! Concern about Asian soybean rust motivated participants to be out in their soybean fields, and consequently, participants learned to identify soybean diseases and other pest problems that they had never before noticed. Participants are more prepared to identify and address common soybean pest problems and are much more aware of steps to take if soybean rust were to arrive in New York State.

While knowledge of IPM and ICM is important, the long-term implementation of these practices is a more critical measure of program impact. After the completion of the TAg program, participants completed an exit survey or participated in interviews to indicate what IPM and ICM practices that they plan to implement.

The farmers involved in 2007 indicated that they “would” or “would try to” implement general IPM practices and soybean IPM practices on approximately 85% of their total acres of soybeans. Details of specific practices to be implemented are shown in Table 4. Very few farmers indicated that they “would not try” a given practice, and one of the IPM practices receiving 14% of respondents indicating that they would not try was “Time fungicide treatments carefully based on plant growth stages and presence of diseases”. It is likely that those respondents are extremely unlikely to use fungicides, rather than their response indicating that they will not conduct their fungicide use in a quality control, IPM way!

**Table 4. Planned implementation of IPM principles in soybean production by participants in soybean TAg**

	<b>Percent of participants who:</b>		
	<b>Will do</b>	<b>Will try</b>	<b>Will not do</b>
<b>General IPM Practice:</b>			
Keep scouting records and management action reports	14	79	7
Use threshold tables and guidelines	64	36	0
Prepare IPM scouting plan before the growing season begins	7	71	21
Collect reference material to help plan your IPM program	36	57	7
Consult your extension educator or IPM educator for new info.	50	50	0
<b>Soybean IPM Practices:</b>			
Perform stand counts	21	79	0
Conduct spring and fall weed identification and surveys	43	57	0
Monitor for weed escapes from herbicides	64	36	0
Scout for diseases: Septoria brown spot, Asian soybean rust, downy mildew, white mold	36	64	0
Scout for soybean aphid and spider mites	57	43	0
Monitor for beneficial insects	57	43	0



Time herbicide treatments carefully based on plant growth stage	57	43	0
Time fungicide treatments carefully based on plant growth stages and presence of diseases	29	57	14
Time insecticide/miticide treatments based on plant growth stages and threshold numbers of insects/mites, and take weather conditions into consideration	36	64	0
Use economic thresholds to guide insect and disease management decisions	50	50	0
Make pest management decisions based on stand health, growth stage, and yield potential	64	36	0
<b>General Crop Management Practices:</b>			
Conduct soil testing to determine proper fertilization needs	62	31	8
Use crop rotation to control weeds and diseases	69	31	0
Review the soil test results with your CCE educator	31	69	0

**Summary:** The TAg programs in Cayuga, Livingston/Ontario, Monroe, Oneida, and Seneca Counties in 2007 were successful at helping 38 participants representing 25 farms to learn and to implement IPM and ICM philosophy and practices on the 6,590 acres of soybeans that they manage in their farming operations. A key aspect of the success of this method is educational opportunities personalized to a producer's specific farming environment combined with interactive and participatory learning. The TAg programs could not succeed without the dedicated efforts of local educators and scouts. Overwhelmingly, producers involved indicated receptiveness to the on-farm season-long TAg approach to soybean IPM education, and have shown a willingness and desire to implement many of the IPM and ICM practices highlighted in the TAg programs. As a result of education and increased awareness, including our efforts through soybean TAg team participation, producers are more vigilant than ever toward pests in their soybeans. Many more producers in NY have expressed their interest in participating in an on-farm soybean IPM education team in the future, and educators continue to identify areas in need of soybean pest and crop education. Continuation of the soybean on-farm education programs will enhance soybean IPM implementation efforts in NY and will improve the exchange of information between producers and extension personnel.

#### **Funding:**

This project was supported by funding from the Northeast Soybean Promotion Board

#### **References:**

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- New York Agricultural Statistics Annual Bulletin. 2007. New York Agricultural Statistics Service. U.S. Department of Agriculture.
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## **Samples of Materials:**

### QUOTATIONS FROM PARTICIPANTS:

- Great program
- Involve more farmers!
- Have meetings for other crops (many made this comment)

Participants were asked what they liked most about TAg:

- Contact with other growers on their farms
- Comparing notes (with other farmers)
- Small group - more open to talk about individual's problems
- Actually going out in the field instead of sitting in a room watching slide shows
- Listening to what works for other farmers
- Having a field scouted

Participants were asked to indicate how TAg has made them better managers of their crops:

- The TAg team made you get out and look in your fields
- I learned how important it is to scout fields
- Make you check fields more often
- Pest and disease identification, spray timing
- More aware of what is happening in soybeans
- Helps to understand the crop better from planting to harvest

Participants were asked to describe one practice they plan to change next year based on information learned during the soybean TAg program in 2007:

- Conduct more scouting (many responded this way)

### “SUCCESS SCENARIOS” FROM EDUCATORS

I walked a soybean field with a TAg farmer (a field other than the one being scouted weekly). The reason being was an infestation of aphids in this field and he was questioning whether or not to treat as aphid numbers were approaching and over threshold in areas of this field. Sooty mold was prevalent in several areas as well. After discussing the scouting protocol in detail with this farmer he decided he would wait 4-5 days and reassess the aphid population before calling in the spray truck. He felt comfortable doing this due to the abundance of aphid predators and the signs that the aphid population may be peaking, i.e. many cast skins and lower numbers compared to three days prior. In the end the population crashed and he cancelled the spray truck. The farmer was very happy that he decided to “wait and see”, and he felt that this outcome was due in large part to his participation in TAg.

Two farmers (a father-son team) who participated in the group beginning with the second meeting were very generous in thanks for our persistent efforts in getting them to this meeting. At the end of the second meeting the son expressed his appreciation to me for my follow up with them and the urging to attend the meeting series. They were quite pleased with the materials that we presented and the time spent “hands on” in the field scouting and answering questions.

### PHOTOGRAPHS:



At this meeting of the Livingston/Ontario County Soybean team, we discovered poor nodulation of soybean roots and we saw a few soybean aphids (photo by Nancy Glazier)



Mary McKellar with the Northeast Plant Diagnostic Center at Cornell University presented information about soybean rust to the Seneca County Soybean team (photo by Nancy Glazier)



On a very windy day near Lake Ontario, Julie Dennis updated the Monroe County soybean team about soybean rust and other foliar diseases (photo by Nancy Glazier)

SCOUTING REPORT, AN EXAMPLE:

Farm name and field location were removed from this scouting report sample for inclusion in the final report

## IPM Soybean Scouting Report

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Farm

Field Location:

Field scouting started June 19, 2007

### Field Description

*Conventional tillage and cultivation used to create 30" rows. Approximately, 186,000 Pioneer 92M70 seeds per acre were planted on May 20, 2007. The seeds were inoculated with Celltech. Dry fertilizer (3-13-45) at 200lbs/acre was added when planting. At my initial visit on June 19<sup>th</sup> determined plant population to be approximately 145,000 plants per acre. Slower emergence and some root rot in wetter areas of the field. The area scouted was comprised of two 11 acre fields which were separated by about 10 acres of corn. The Eastern most field had a hedgerow along the east side which contains buckthorn. Both fields had a grassy ditch along the south end and a corn field to the north. The Western most field has a grassy ditch along the west side and was home to this year's Asian Soybean Sentinel Plot. The Sentinel Plot was established on July 9 by marking off a 50'x50' section.*

*The variety of soybeans planted was ideal for the sentinel plot because they stayed green until 9/25/2007 allowing for a longer period of sampling.*

### Scouting for Weeds

*The field had quack grass, lambsquarter, ragweed, dandelion and nutsedge present. None of the weeds appeared to be overtaking the soybean plants, though. The following visit found volunteer corn, pigweed, smartweed, bindweed and annual grass growing as well. Roundup applied to the field on June 25<sup>th</sup> at a rate of 1 \_ qts per acre. On July 2<sup>nd</sup> it is noted that some weeds are being affected but not the nutsedge. The weeds continued to die off and were not a problem for the rest of the season.*

### Scouting for Insect Pests and Related Organisms

*Weather conditions were great for aphid growth. Scouting on June 19<sup>th</sup> found about aphids more concentrated on the upper trifoliolate leaves of the plant with numerous beneficial organisms present. Thrips and ground beetles were noted, also. The aphid population continued to increase and was around 165 per plant on 7/2/2007. The following week the aphid count was up to 700 per plant and the [farmers] were willing to give it a few days while they harvested their hay. Insecticide was applied to the fields around 7/15/2007. And the aphid population dropped to about 20 per plant then 5 per plant then 0 per plant and finally increased but to no more than 9 per plant. Flea beetles and spider mites were noted starting on July 23<sup>rd</sup>. Spider mites were not found in the eastern most field. The defoliating insects like grasshoppers and Japanese beetles were noted*

*around beginning of August but never cause significant damage to plants. Towards the end of August some weevils were seen but only one or two during the field scouting.*

### **Scouting for Diseases**

*Brown spot was noted on the lower leaves during my June 25th through July 17<sup>th</sup> visits. The following visit Brown spot was noted on the upper leaves as well as frog-eye spot. Root/Stem rot was noted on August 20<sup>th</sup> and the following week white mold with sclerotia and downy mildew were noted. Although the downy mildew was on many leaves it did not cause significant damage. Powdery mildew was noted on 9/4/2007 in the Sentinel plot.*